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TRAINING FOR WAR INDUSTRY

Plant Schools

BULLETIN No. 3

Published by

DEPARTMENT OF LABOUR, OTTAWA

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INTRODUCTION

The previous bulletins in this series have dealt with Pre-Employment Training in Vocational Schools and Apprenticeship Training in industry. There is, however, a wide range of operations in modern industry for which satisfactory training can not be given in regular vocational schools but which do not require the degree of technical knowledge and the wide range of skills acquired during a long term apprenticeship. This is particularly true of industries operating under war conditions where urgency and speed are the keynotes of production.

The objective of such training is to impart the essential amount, and no more than the essential amount, of technical knowledge and practical skill in the shortest possible time. From a long range point of view there is no doubt that such concentration on acquiring skill only on one narrowly specialized occupation is undesirable. From the point of view of genuine vocational education it is equally undesirable because in the post war period it is possible that many "one job" workers will have to be retrained in order to give them a wider range of skills, otherwise they will inevitably fall back into the category of unskilled workers who in the past have constituted the greater part of the national unemployment problem.

In spite of all this, however, there seems at present to be no alternative because of the vital need of stepping up war time production to the maximum amount in the minimum of time. A great deal of the anticipated injurious results of such narrow training can be prevented if employers will carry on in their own plants a system of upgrading and promoting employees from the less skilled to the more skilled occupations. In other words, if an employee shows capabilities in doing a job requiring little skill, give him an opportunity on a job requiring slightly more skill and knowledge. Not only will a plan of this sort promote stability by reducing labour turnover, but it will also ultimately turn out more units of production per man hour. The subject of up-grading will be dealt with in a later bulletin in this series.

Specialized Training

This specialized type of training in industry can be given by two different methods:

1. Actual training on the job itself under the direction of the foreman or charge hand.
2. Training in a vestibule or plant school.

Each method has advantages and whether one or the other, or a combination of both, would be most effective will depend on the situation in the individual plant. Experience has shown that, as a rule, where training and production are mixed both suffer. In training, the initial emphasis must be placed on care and accuracy within the limits required. Speed will be attained later with practice. If, at the outset of his working career a man develops careless habits and slipshod methods, such tend to persist and become worse so that he will leave behind a trail of broken tools and spoiled materials. Thus while his gross production may appear impressive, the net result is disappointingly poor. No matter how low his hourly wage, such a man is an expensive luxury. These factors are less likely to occur in a plant school than in job-training. Moreover, a plant school is better for younger workers who enter employment for the first time without previous practical experience. It serves as a transitional stage between the vocational school and the different atmosphere of the productive shop.

Features of a Plant School

What then constitutes a plant school? The essential factors are outlined as follows:—

1. Part of the plant should be set aside for training purposes with whatever machine tools, benches, and equipment are necessary. The floor space devoted to this purpose will vary in relation to the size of the plant and according to what is required of the school. It cannot be too strongly emphasized that the success of the school bears no necessary relation to its size but is dependent on its planning, organization and supervision. It should, however, have an entity of its own and not be scattered through several departments at random.

2. It should be under the supervision of a responsible company official familiar with the personnel and training requirements.

3. It should have its own instructors and not be dependent on the casual spare time help of foremen, etc. These instructors should be selected primarily for their trade knowledge and skill, but ability to impart their knowledge is an important factor. Instructing in the plant school should be their primary and main responsibility.

4. Though the work done in the school should be selected mainly for its training value, there is no reason why it should not also have productive purposes. It could be selected from various departments of the plant.

5. It is desirable that part of the time be spent in classroom instruction so that the trainees may not only learn how a thing is done but also why it is done in that particular way. In the classroom, training would be given in the theory relating to the practical work done in the shop. It might also include mathematics and blue print reading.

6. The training given in the school can be either basic and general or specialized toward a particular machine or operation.

7. The length of the training period would depend on:—

(*a*) the trainee's background in education and practical experience.

(*b*) the requirements in skill and knowledge of the job for which he or she is being trained.

As trainees attain the standard desired they should be moved out into the regular production departments.

How the War Emergency Program can Help Plant Schools

The War Emergency Training Program is ready to assist in carrying on plant schools subject to the following conditions:—

1. That the general setup and organization of each school has been approved by the Supervisor of Training, Dominion Department of Labour.

2. That the company concerned and a representative of the War Emergency Training Program exercise joint supervision over its operation.

This assistance may take the following forms:—

1. Technical advice and suggestions.
2. Provision of part-time classroom instruction.
3. Payment by the program of salaries of instructors in approved plant schools.
4. Payment by the program of weekly allowances to trainees in full-time attendance at approved plant schools, at the following rates:—

Heads of families—$13. Single trainees living away from home—$8 to $9. Single trainees living at home who were not employees of the company at the time of their entrance to the plant school—$5. Single trainees living at home who were employees of the company at the time of their entrance to the plant school—$8.

The maximum period for which the program will pay these allowances is 12 weeks, but no allowance will be paid by the program to any trainee in a plant school who has graduated from a pre-employment class conducted by the War Emergency Training Program, except where the training in the plant school is (*a*) of a more advanced nature or (*b*) of a type which cannot be given with the facilities available in pre-employment schools.

Company Responsibilities

Each company shall have the right to select trainees to attend a plant school but, if it so desires, it may be assisted by the representative of the War Emergency Training Program in such selection. Trainees may be selected either from the present employees of the company or from outside sources. They may be either male or female.

Each company shall determine the kind of training to be given.

Each company operating a plant school shall provide the necessary facilities including floor space, light, heat, power, machinery and equipment, hand tools, working materials and supplies.

Trainees may be admitted to a plant school from companies other than the company on whose premises the school is held if mutually satisfactory arrangements can be made by the companies concerned. This will permit several smaller plants to carry on a co-operative school where such is desired.

As very few qualified instructors are now available, any full-time instructors for a plant school will probably have to be furnished by the company from its present working force.

Further information may be obtained by writing to the Supervisor of Training, Department of Labour, Ottawa, or to one of the following Regional Directors of the Program:—

Dr. F. H. Sexton	Nova Scotia Technical College, Halifax.
W. K. Tibert	Department of Education, Fredericton.
J. T. Lamontagne	129 Cote de la Montagne, Quebec.
H. H. Kerr	Department of Labour, Parliament Buildings, Toronto.
C. S. Landon	Fourth Floor, Customs Buildings, Winnipeg.
W. A. Ross	Department of Education, Regina.
J. H. Ross	128th-7th Ave., Calgary.
F. T. Fairey	Department of Education, Victoria.

Up to the present, the number of real plant schools carried on in Canadian industries is very small. An increase in that number, in both large and small plants, would be profitable. For the guidance of employers, descriptions of a few typical plant schools are given in the following pages.

PLANT SCHOOL

CANADIAN GENERAL ELECTRIC COMPANY, LTD., PETERBOROUGH, ONTARIO

The Plant School is situated in one of the Company's machine shops. A special area 175 feet by 80 feet has been allocated for the sole use of the School. Training commenced on June 18, 1941, with 12 learners and 2 instructors. At present, the School operates two shifts with 223 learners and 10 instructors. Approximately 11·5 per cent of the 383 learners admitted to the school up to November 1st have been dismissed as unsatisfactory, or quit on their own accord.

Purpose of School

The purpose of the Plant School is to train and supply machine operators, workers for Assembly Line, and to provide "set-up" men for various machines.

Hours of Operation

Day Shift (58 hours) Mon., Tues., Wed., Thurs. 7 a.m. to 6 p.m., Friday and Saturday 7 a.m. to 5 p.m.

Night Shift (60 hours) Sun., Mon., Tues., Wed., Thurs. 6 p.m. to 4.30 a.m., Friday and Saturday 5 p.m. to 3.30 a.m.

Equipment

The School is equipped with the latest type Shapers, Engine Lathes, Turret Lathes, Milling Machines (Horizontal and Vertical), and Boring Machines.

There is also adequate space and equipment for 5 Bench Classes of 30 learners each.

Administration

The School is in charge of the Chief Instructor who reports direct to the Works Manager or other officials designated by him. These officials direct the policy of the School and the nature of the training to be given.

Trainees

Source.—Approximately 90 per cent of trainees admitted to the School are recruited from the War Emergency Classes operated under the Dominion-Provincial War Emergency Training Program.

Requirements of Admission:

Age.—16 years of age and up. Not too many males, single, between 21 years and 26 years of age.

Education.—No minimum academic standard required.

Experience.—Skilled, Semi-skilled, War Emergency Training, or other vocational or technical training.

Selection.—Selection is made through the Company's Employment Office. No aptitude or other tests given to applicants. There is no medical or physical examination.

Rates of Wages

Male.—21 years of age or over 40 cents per hour. Under 21 years of age with War Emergency Training Certificate or equivalent experience 35 cents per hour. 18 years to 20 years, inclusive, without War Emergency Training Certificate or equivalent experience 24 cents (first 4 weeks), 26 cents (2nd 4 weeks), 30 cents (3rd 4 weeks), 35 cents (4th 4 weeks) and 38 cents until 21 years of age.

Female.—16 years of age and over without War Emergency Training Certificate or equivalent experience 24 cents (first 4 weeks) and 26 cents fifth week. 16 years of age and over with 3 month War Emergency Training Certificate or equivalent experience 35 cents.

Overtime.—Time and one-half for all time worked over 9 hours in one day except Saturday when time and one-half is paid for time over 5 hours worked. These are minimum rates. Employees are constantly upgraded and wage rate increased accordingly.

Instructors

All of the 10 Instructors are practical machine shop men and one holds a Vocational Teacher's Certificate. The instructors have no other duties.

Nature of Training

General instruction

Blue Print Reading; reading and use of precision instruments such as Micrometers, Verniers, Calipers, Protractors, Radius gauges, Snap gauges, Depth gauges, etc.; Simple Layout; fitting and assembly work including General Chipping—flat surface, keyways, etc., Filing—internal, Filing—external, Drilling and tapping, Screwing, Using hack-saw.

Details of Instruction for Fitters

A. Layout and chip one surface flat, chip and file one surface to surface plate, chip keyway $\frac{1}{2}$ inch by $\frac{1}{4}$ inch without using file, drill $\frac{19}{32}$ inch and $\frac{15}{32}$ inch hole in piece and file square to a gauge, drill and tap $\frac{3}{8}$ inch, $\frac{1}{2}$ inch, $\frac{5}{8}$ inch holes, cut oil grooves on one surface (Blue Print).

B. Lay out and file to snap gauge piece 3 inch by $1\frac{1}{2}$ inch by $\frac{1}{4}$ inch then fit to female piece (Blue Print).

C. Lay out and file to fit male and female taper piece 60 degrees. (Blue Print).

D. Lay out and file to shape taper piece with shoulder male and female 60 degrees. (Blue Print).

Canadian General Electric Co., Peterborough, Ont.,
Plant School—Bench Fitting.

Canadian General Electric Co., Peterborough, Ont.,
Plant School—Machine Shop.

E. File and fit together 2 pieces 1 inch square with a double taper joint. (Blue Print).

F. Lay out and fit by filing a male and female hexagon. (Blue Print).

G. Lay out and file to size 2 pieces 3 inches by 2 inches by 1 inch. Drill and file 1¼ inch by ⅜ inch slot in centre of piece; fit pieces together with a gib and taper key so that there is no lateral movement.

H. Cut out and file to fit 2 pieces ⅛ inch plate 3 radii ½ inch, ⅜ inch, 5/16 inch. (Blue Print).

I. Lay out and file to size a tap wrench 7 inches long, drill and file 4 different square holes to suit taps. (Blue Print).

J. Cut out and file to 80 degrees male and female gauge. (Blue Print).

K. Lay out and drill 3 holes in a piece of steel plate 6 inches by 3 inches by ½ inch; file to size of a plug so that plug will fit a round, square and triangular opening. (Blue Print).

L. Lay out and file to size 3 open steel 60 degree triangles so that each smaller triangle fits into the other. (Blue Print).

M. cut out of ⅛ inch plate and lay out to 16 different dimensions; file to shape. (Blue Print).

N. Cut out of ⅛ inch plate and lay out to 13 different dimensions, 2 parts bent at right angles. (Blue Print).

O. File to 90 degrees machinists try square. (Sketch).

Trainees are also taught the different names and use of all tools used by fitters, the correct angle to grind chisels, scrapers, drills; the use and application of the micrometer, vernier, the correct way to use a hacksaw.

Machine Operators

Trainees are chosen from applicants who have had previous experience or who have taken a machine shop course at a Vocational School or other training centre.

Training is given on shapers, engine lathes, turret lathes, milling machines, (horizontal and vertical) and boring machines in school.

Instruction on shapers, drills, planers, slotters and grinders is given on production floor by experienced workers and foremen.

Turret Lathes.—Bar turning, Chucking operations, Threading Die-Head, Drilling and boring, Tool setting and grinding.

Engine Lathes.—Turning between centres, Chucking work—external, Chucking work—internal, Screw cutting—external, Screw cutting—internal, Tool setting and grinding.

Millers.—Fly cutting, General Milling (Vise), General Milling to lay off, Indexing head operations, Rotary table operations, End milling.

Grinders.—General grinding, tool grinding, Grinding in lathe using Dumore Grinder.

Drills.—Drilling to lay off, Drill and ream, Tapping.

Shapers—General shaping (Vise), Shaping and setting to lay off, Tool grinding and setting.

Horizontal Boring.—Jig boring, General boring—external, General boring—internal Tool grinding and setting.

General Training.—All machine operators are given instruction in the following: Care of machine, Operation of machine, Special mention of value of machine, Positioning machine, Speeds and feeds.

Detail Training

Milling machine.—Square up steel block on six sides, using vise and table, use only fly cutters (to avoid possible damage to mill cutters) Explanation of cutting action to give better understanding of speed and feed with one cutting edge. Then follows with simple production work becoming more complicated as trainee progresses.

Lathes.—Instruction in tool grinding, speeds and feeds, centre to centre and chuck work, simple lathe work to operations involving boring, facing, turning and threading.

Horizontal Boring Machine.—Trainees for the machine are selected from production department, usually engine lathe operators of proven skill. First period of training is devoted to jig boring. Vernier scales used for all adjustments. Production work follows. It usually takes six to eight weeks to train an operator for work in the machine shop.

General Remarks

The work done by trainees is about 50 per cent production and 50 per cent tool and jig work. All pieces for tensile and impact tests are made by trainees. This involves turning, threading, shaping and milling. The average output of test pieces is twenty-five per day.

Rating Trainees

Trainees are graded on; their aptitude for mechanical work, their ability to learn, their sincerity and desire to work and their ability to get along with fellow workers.

Training Records

A weekly record is kept of trainees' progress. When they have reached a point of adequate efficiency, they are transferred to Machine Shop or Assembly Department.

PLANT SCHOOL

DOMINION ENGINEERING WORKS, LONGUEUIL, QUEBEC

The idea of a plant school in this organization may be said to have been an integral part of the planning for production. It is policy that, with the exception of administrative personnel and a limited number of skilled tradesmen all new staff must be inducted through the school before being placed at work in the department.

Relationship of Plant School to Vocational Training Centres

A close relationship exists between the plant and pre-employment training centres. This relationship is maintained and is constantly being improved by personal contacts and exchange visits between the personnel superintendent of the Company and the principals or instructors of the training centres. Although the training centres do not have a duplicate of the equipment as existing in the plant they develop the initial skills required to the point where they may more readily be developed after arrival at the plant thereby relieving the plant school instructors of the necessity of starting out from the very beginning of the instructing process. This relationship is of further value as a weeding process by eliminating persons without aptitudes or with improper attitudes towards work or discipline.

It is a point worth noting, in connection with the liaison between the plant and training centres that the principals or the instructors of the latter are informed and expected to pass on to trainees, who are offered employment by the Company, the terms and conditions of employment under which they may expect to work, including rates of pay, hours of work cost of board and lodging, housing conditions, net position of married men after meeting expenses out of wages and so on. In this way it is believed a great many misunderstandings and false starts have been avoided.

Training Organization of the Plant School

The training organization of the school functions under the guidance of a committee on training whose members are the plant manager, plant superintendent and the personnel superintendent. This committee decides on matters concerning policy and curriculum of the school, the execution of which is delegated to a full time chief instructor. Working under the latter and directly in the machine tool section of the school are 4 instructors, 2 on night shift, 2 on day.

Physical Property of the School

Physically the school is divided into two sections—a classroom and a machine tool section.

The classroom consists of a separate room within the plant containing the following equipment:—

1. Benches and tables (capacity 30-40 trainees)
2. Blackboard
3. Demonstration material (taken from shop for sketches and lectures)

The machine tool section is located in a corner bay in the shop adjacent to production operations and is equipped with standard production machine tools as per the following list:—

Bench vises—4
Vertical Millers—2
Horizontal Millers—1
Engine Lathes—4—20" with 4 tool revolving head
Shapers—school uses production tools in shop
Medium Slotter—1
Medium Drill Press—1
Heavy Duty Grinder—available in production shop
Magnetic Surface Grinder—available in production shop

Scope of Training in School

Classroom subjects are covered in parallel with machine tool work, the whole being based on a working week equivalent to the standard working hours of a regular shift.

Classroom work is apportioned to trainees in accordance with individual capacities and covers the following range of subjects:—

Shop mathematics
Sketching
Elementary Blue Print Reading
Use of measuring and Precision Instruments
Proper care of Machine Tools
Safety
Technology (from assigned reading in text*)

Machine Tool Instruction consists of a series of graded exercises under the constant supervision of instructors. Exercises are developed by the instructors from repair jobs that may be referred from the plant to the school together with roughing out to pre-

*Text—Machine Shop Practice Book I; Harry A. Jones; Thos. Nelson & Sons.

scribed tolerances of certain cutter, reamer and other cutting tool pieces which are used by the tool room, after reduction there to finish tolerances. By this method the school is made productive and the trainees are made to feel that they are contributing to the output of the shop.

Duration of Training

Classroom subjects occupy about one hour per day of the trainees time during his period in the school which varies as a rule between 3 weeks and a month. During this same period the chief instructor may and does assign a limited amount of home-study from the standard text or other material.

Following graduation of trainees to the shop they are assigned to continuing instruction under the foreman for a further period of 5 months which gives a total elapsed training and follow up on each trainee of approximately 6 months.

Capacity of the School

School facilities permit of 50 trainees being handled at a time on each of two shifts and while the number may appear large in terms of the number of instructors on the staff it should be noted that the majority of trainees have been recruited from the pre-employment training centres which materially reduces the amount of attention that must be given per trainee in elemental details of machine operation.

Progress Records Kept

The personnel superintendent is kept advised of progress of trainees through reports furnished by the instructors during the time the trainees are in the school. Any matters calling for adjustment are taken up with the trainee at once and where possible corrected. In this way mis-fits are re-oriented, malcontents straightened out and failures released before any damage to the individual or the company can occur.

EMPLOYEES TRAINING SCHOOL, ORDNANCE DIVISION

THE OTIS-FENSOM ELEVATOR COMPANY LIMITED, HAMILTON, ONTARIO

The Employees Training School occupies a special section 80 feet by 100 feet in the Ordnance Building. It commenced operations in November, 1940, with three instructors and sixty trainees. To-day, it operates on three shifts with nine instructors on the School Staff and two hundred trainees in attendance. Eight hundred and thirty men and three hundred and forty-nine women have been trained to date. Less than five per cent of those enrolled fail to qualify as operators and approximately five per cent leave the School on their own accord. The School operates as a separate unit on regular production and all parts made there must pass the official Inspection Department.

Purpose of the School

The purpose of the School is to supply the Ordnance Division with trained machine operators, bench hands and inspectors.

Hours of Operation

Day Shift—7 a.m. to 3 p.m.—4 Instructors —70 Trainees.

Evening Shift—3 p.m. to 11 p.m.—3 Instructors—70 Trainees.

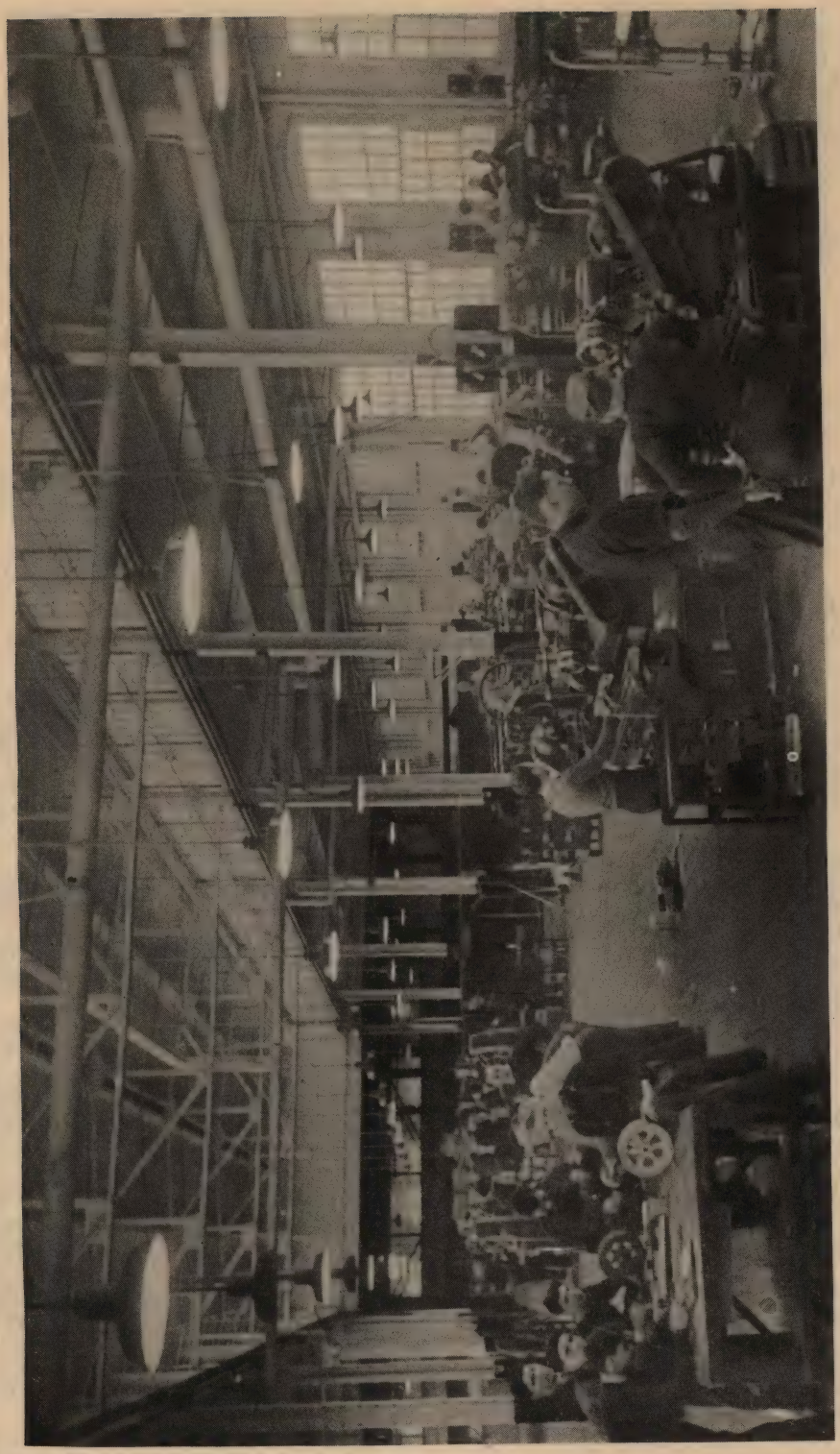
Night Shift—11 p.m. to 7 a.m.—2 Instructors—60 Trainees.

There are no Bench Operators on the Night Shift. Female trainees attend the Day and Evening Shifts only.

Equipment

All machines used in Employees Training School are of the latest type and include:—

Machine	*Number used*	*Make*	*Style and Size*
Lathes, Engine	3	Hendey	14 by 30
Lathes, Engine	2	Monarch	12 inch KK; 14 inches AA
Millers	1	Milwaukee	Model K No. 2
Millers	3	Milwaukee	Model H No. 2
Millers	3	Milwaukee	Model H No. 2 P1
Radial Drill	1	Cincinnati	3-foot Arm
Radial Drill	1	Bickford	3-foot Arm
Shaper, Horizontal	1	Cincinnati	24 inches Heavy Duty
Shaper, Horizontal	1	Cincinnati	20 inches Heavy Duty
Shaper, Vertical	1	Pratt and Whitney.	6 inches
Slotter, Vertical	1	Douglas	No. 7
Grinder, Surface	1	Brown and Sharpe.	No. 2
Grinder, Universal	1	Landis	10 by 24 Type C
Grinder, Plain	1	Landis	6 by 30 Type C
Benches	16	Equipped with vises	



Otis Fensom Co. Ltd., Hamilton, Ont.,
Plant School—Men's Section.

Administration

The School is under the supervision of the Chief Instructor who reports to the Superintendent of the Ordnance Division. These officials, in collaboration with the Manager of Munitions, determine the policies and decide the nature of the training to be given.

Trainees

(*a*) *Source:*

(1) Male Trainees—60 per cent to 75 per cent from carefully selected applicants. Technical School background preferred. (25 per cent of these men were from farms)—15 per cent to 20 per cent from War Emergency Training Classes—15 per cent to 20 per cent from regular Technical School Classes.

(2) Female Trainees—All female trainees carefully selected through Company's Employment Office by competent female Personnel Officer.

(*b*) *Requirements of Admission:*

Men.—18 years of age and up. Technical School students preferred, but selection based on character, general intelligence, mechanical background and suitability for the training.

Women.—18 years to 32 years preferred. Junior Matriculation or its equivalent.

Final selection made through Company's Employment Office. No aptitude or mechanical test given. Standard Medical Examination by Company's Physician.

(*c*) *Wages:*

(1) Male—Single—36c per hour to start. Married 40c per hour to start. Increases—4c per hour after first 6 weeks, then upgraded according to ability and experience.

(2) Female 33c per hour to start. Increased to 36c per hour after first 6 weeks. 40c per hour after first 10 weeks, then, upgraded according to ability and experience.

Instructors

One Chief Instructor—An experienced Tool and Die Maker holding permanent Technical School Teacher's Certificate.

Eight Instructors—Experienced machinists without any previous teaching experience but possessing personality suitable to instruct and handle trainees. These men are coached in teaching practice by the Chief Instructor. Each Instructor usually supervises approximately 20 trainees.

Length of Training

Originally, a ten weeks' course was given but consistent demand for trainees has reduced the training period to an average of six weeks.

Nature of Training

(*a*) *Technical Training.*—The Company relies on War Emergency Training Classes and Technical Schools to give trainees technical training.

(*b*) *Shop Training.*—Entire Shop Training, including Blue Print Reading, is given in group instruction at the various machines and benches.

(*c*) *Classification of Work:*

Fitters and Assemblers—Filing external, filing internal, drilling and tapping, screwing (Die-plate), General chiseling operation, using hacksaw.

Inspection—General inspection, setting up for inspection.

Lay Off—General lay-off work.

Speed Drills—Drilling to jig, drilling to lay off, tapping.

Grinders—Grinding internal, grinding external, wheel dressing.

Radial Drills—Drilling to lay off, drilling (jig), drill and ream, tapping.

Lathes—Turning between centres, chucking work external, chucking work internal, screwcutting external, screwcutting internal, tool grinding and setting.

Millers—General milling (vise), general milling to lay off, indexing head operations, rotary table.

Shapers—General shaping (vise), shaping and setting to lay off, tool grinding and setting.

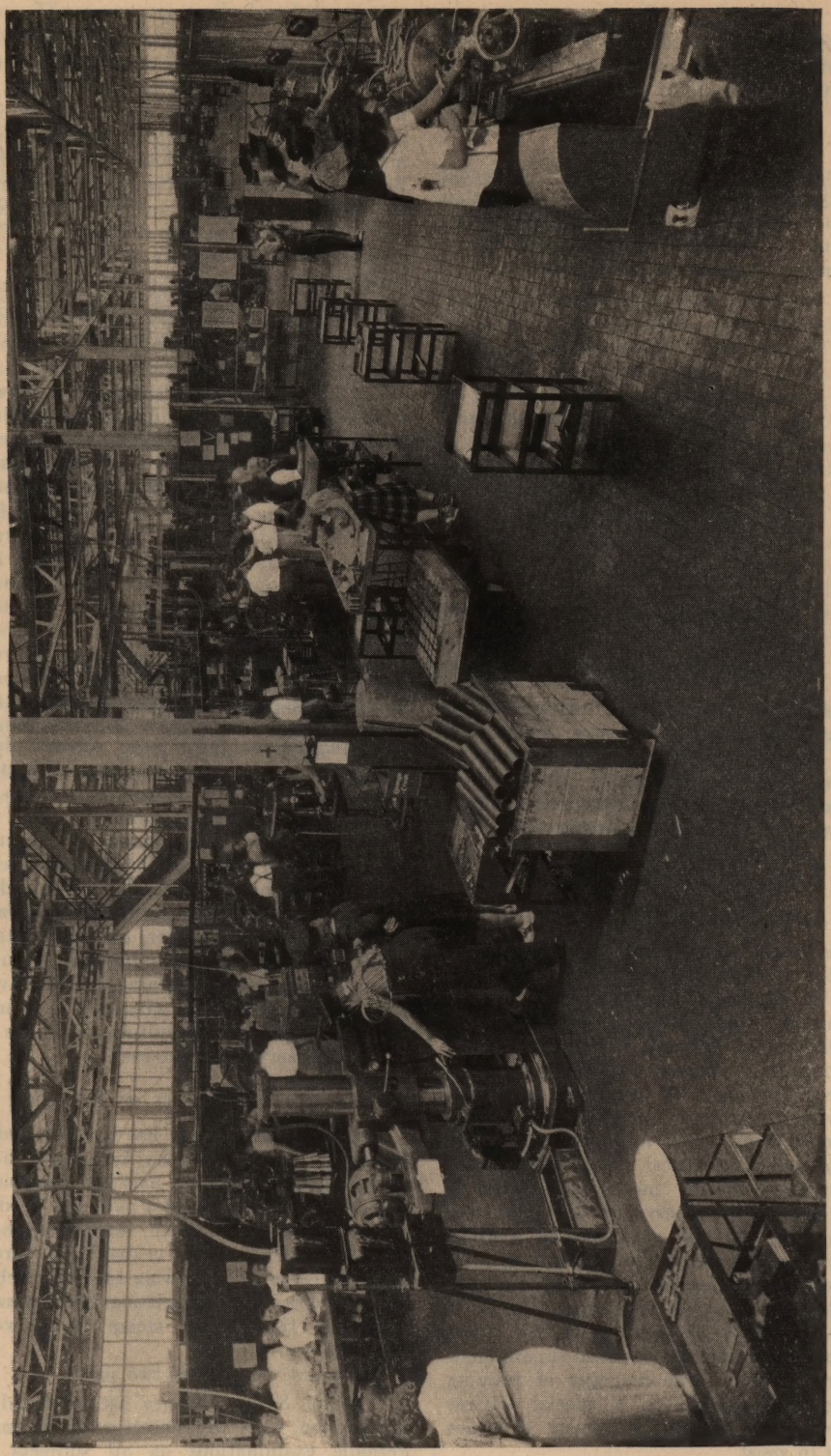
Slotters—General external, general internal, setting and slotting to lay off, form slotting.

(*d*) *Rating of Trainees.*—Every trainee is rated at the conclusion of each working day on Form WB 131. Information is later transferred to permanent records in School Office.

(*e*) *Trainees' Rating Schedule.*—Excellent —100 per cent, Very good—90 per cent to 99 per cent, Good—75 per cent to 89 per cent, Fair—60 per cent to 74 per cent, Poor—below 60 per cent.

This general rating schedule covers the Instructors' overall estimate of trainee's ability and knowledge as well as his general past record of faults. The percentage given is used as a basis from which to calculate his final daily percentage.

Scrap, broken tools, or use of wrong methods occurring during the day does not



Otis Fensom Co. Ltd., Hamilton, Ont.,
Plant School—Women's Section.

effect the "Excellent", "Very good", etc., rating but decreases the daily percentage by the following amounts, scrap 10 per cent, broken tool 10 per cent, use of wrong method 15 per cent.

General Remarks

The number of female trainees is increasing rapidly and within six months it is expected that at least 30 per cent of workers will be women. As compared with men, experience has proven women operators to be:—

(1) the equal of men when doing jobs for which they were trained. (NOTE: Women not trained to operate large or reciprocating machines.)
(2) more persistent in repetitive work.
(3) more attentive to their work throughout the entire working day.
(4) able to more quickly acquire a sense of feel with measuring instruments.
(5) a stabilizing influence.

The acute shortage of skilled labour and the urgent demand for production has necessitated the training of operators only instead of skilled mechanics. This is evident in the Company's Tool Room where there is a generous supply of operators who are doing many jobs formerly done by toolmakers. For instance, a School trainee is operating a Jig Borer and female operators are doing most of the grinding of milling cutters. This work is also inspected by women.

Practically all the Tool Cribs are manned by female trainees. These trainees, although willing, did not demonstrate sufficient adaptability for machine operation.

The Company has endeavoured to develop a feeling of comradeship and helpfulness amongst the trainees. This creates a feeling of co-operation and pride of achievement which helps promote genuine Industrial Goodwill.

TRAINING OF SKILLED AND SEMI-SKILLED TRADESMEN

CANADIAN INTERNATIONAL PAPER AND AFFILIATED COMPANIES

This plan which is a combination of upgrading and plant school was commenced about the end of 1940. It was designed to help overcome the shortage of skilled tradesmen in Canada's war industries and to afford its own employees an opportunity of assisting in some practical way in the prosecution of the war on its industrial side.

Administration and Supervision

It is under the general supervision of a Director of Training located at the Head Office in Montreal. In each mill there is a Training Advisory Board answerable to the Director of Training. It consists of the following, mill manager (chairman), plant engineer (manager of training), personnel supervisor (secretary), general superintendent, master mechanic, mill engineer, steam superintendent, electrical superintendent.

Instruction in the mechanical trades is under the direct supervision of the master mechanic or the mill engineer and is given by them and by instructors drawn from foremen or skilled tradesmen. Instruction in the steam plant and in electrical work is under the direct supervision of the steam superintendent and the electrical superintendent respectively. The manager of training assigns each trainee to a special adviser selected from skilled tradesmen who are willing to assist.

Selection of Trainees

At the outset these were selected from men employed by the company, Group A, semi-skilled men in mechanical steam or electrical departments, Group B, men employed in other departments. They must be able to read and write English and preferably should have completed grade school mathematics and are chosen from men who, for one reason or another, are unacceptable in the armed forces. The number in Group A is limited only by the training facilities available in each mill, and in Group B to 25 men. The exact method of recruiting trainees is left to the Advisory Board at each mill.

Length and Nature of Training

The length of training has been limited to 12 months so that it may be of the maximum usefulness under existing conditions. Although this is too short a period to produce a highly skilled tradesman, satisfactory basic training can be imparted in that time. Training is given in the following trades; machine shop, blacksmithing, pipefitting, welding, millwrighting, tinsmithing, steam plant work, electrical work.

The course consists of two parts:—

1. *Home Study Courses* are arranged in conjunction with the Director of Training. Periodic examinations on all subjects are

given. The papers are marked and the results are returned to the local manager of training. The full course must be completed within the year. The Company pays the initial cost of the course, $64.25, which is repaid by the trainee through a payroll deduction of $1.25 per week. The following is the detail of the course for machine shop; measuring instruments, bench work, drilling machines, general appliances and processes, erecting, shaper and slotter, engine lathes, lathe practice, lathe thread cutting, planers, boring mills, grinding equipment and practice, tool grinding, working chilled iron, milling machines, gear calculations and gear cutting. In all mechanical trades the following subjects are optional, fractions, decimals, weights and measures, ratio and proportion, powers and roots, mensuration, use of trigonometric table.

2. *Shop Work.*—The full text of the Home Study Courses is made available to the instructors so that the theoretical and practical parts of the training may be properly co-ordinated. Students in Group A (already employed in mechanical departments) continue in their present occupations where every effort is made to assign jobs which will broaden their experience. They may be required to attend instruction after working hours in practical work which it is impossible to give in the course of their regular duties. Students in Group B continue in their present occupations until there is an opportunity to join one of the mechanical, steam or electrical departments. Where his present occupation precludes practical work he is required to attend for shop work after hours twice a week, each session lasting three hours. A minimum of 300 hours of such training is required.

Apart from the cost of the home study course, the company pays all other expenses such as texts for instructors, wages of instructors and cost of supervision.

Subsequent Employment of Trainees

The company gives no guarantee that trainees can be, or will be absorbed in the staff of each mill on the completion of their training. Their services can be made available to war production industries who need such labour. During 1941, however, the members of the Pulp and Paper Association inaugurated a plan designed to (*a*) increase training opportunities, (*b*) increase productive employment at each mill, (*c*) assist in removing "bottle necks" in war production.

Each mill, according to its equipment, took orders for sub-contract work connected with shipbuilding, aircraft and munitions, etc. A co-ordinator was appointed by the association and the sub-contracts allotted to the mills participating. This work was done in their machine shops which were operated 2 or 3 shifts per day according to the maintenance demands which constituted the normal work of the shop. This provided wider opportunities for training and permitted the absorption of greater numbers of trainees.

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